

(19)



Europäisches Patentamt  
European Patent Office  
Office européen des brevets

(11) Publication number:

**0 403 928  
A1**

(12)

## EUROPEAN PATENT APPLICATION

(21) Application number: 90111064.3

(51) Int. Cl.<sup>5</sup>: E05D 7/04

(22) Date of filing: 12.06.90

(30) Priority: 20.06.89 IT 5936989 U

(43) Date of publication of application:  
27.12.90 Bulletin 90/52

(84) Designated Contracting States:  
AT CH DE ES FR IT LI

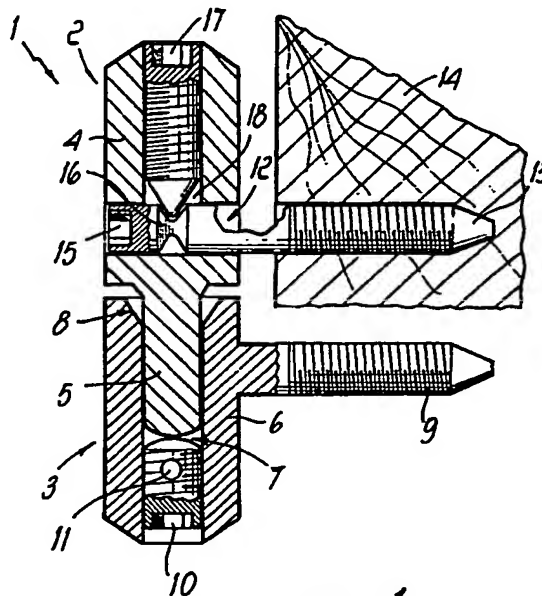
(71) Applicant: OTLAV S.p.A.  
Via A. Volta 26  
I-31025 Sarano Frazione di Santa Lucia di  
Piave (Treviso)(IT)

(72) Inventor: Manzalini, Noberto  
Via Vecchia Trevigiana 143  
I-31015 Conegliano (Treviso)(IT)

(74) Representative: Modiano, Guido et al  
MODIANO, JOSIF, PISANTY & STAUB  
Modiano & Associati Via Meravigli, 16  
I-20123 Milano(IT)

### (54) Adjustable hinge structure.

(57) The hinge structure has a male element (2) defining a first body (4) having an axially protruding pin (5), and a female element (3) defining a second body (6) having formed therein an axial seat (7) rotatably accommodating the pin (5). A first threaded stem (9) is radially connected to the second body (6) and is securable to a first member. A second threaded stem (13) is radially connected to the first body (4) and is securable to a second member (14) to be hinged to the first member. A transverse through seat (12) formed in the first body (4) accommodates the second threaded stem (13), and an externally activatable locking device (16,17) is accommodated in the first body (4) for releasably axially locking the second threaded stem (13) in the transverse through seat (12). An externally activatable adjustment screw (10,11) is accommodated in the seat (7) for adjusting the axial position of the pin (5).



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## ADJUSTABLE HINGE STRUCTURE

The present invention relates to an adjustable hinge structure.

Hinges constituted by a male element and by a female element are currently used in the field of furnishing components.

The male element is usually constituted by a cylindrical body which has an axial pin and an externally threaded radial stem which is associable with a fixed component such as, for example, a door frame.

The female element is also composed of a cylindrical body which has an axial seat for accommodating the pin of the male element, and an externally threaded radial stem which is associable with a movable component such as, for example, a door.

When installed, the pin is usually directed upward, while the female element is arranged above the male element.

In order to allow optimum installation, hinges known as "adjustable" hinges have been provided. Such adjustable hinges have means adapted to vertically and laterally vary the position of the male and female elements for example with respect to the door frame.

Said means are generally constituted by screws which make the pin axially movable with respect to the male element and by a threaded stem which passes through the cylindrical body of the female element and is associated with the door or with a shutter and is left to protrude by the amount required for the correct closure of the shutter or door.

However, in these known hinges the need has arisen to arrange the stem of the female element opposite to the end adjacent to the male element in order to allow the insertion of the pin in the axial seat defined on said female element.

The mutually spaced arrangement of the threaded stems of the male and female elements, however, has created a disadvantage: the hinge is subjected to displacement, i.e. its axis changes, creating problems of correct arrangement for the door.

In order to eliminate this disadvantage, the male element, which is associated with a fixed component such as a door frame, has been provided with a second externally threaded stem which protrudes radially at the end opposite to the one which bears the pin.

This solution, however, is structurally expensive and does not allow to industrialize the assembly step with conventional and known machines.

The aim of the subject of the present application is therefore to eliminate the disadvantages

described above in known types by providing a hinge, the components whereof can be rapidly and easily associated with one another and with the parts of the required furniture elements, while allowing at the same time the optimum installation and adjustment of their position for example with respect to a fixed support.

Within the scope of the above described aim, another important object is to provide a hinge which is structurally simple.

Another important object is to provide a hinge which associates with the preceding characteristics that of having excellent functional stability while preserving a correct axial arrangement.

A further object is to provide a hinge which is reliable and safe in use, has modest production costs and allows industrialization, during assembly, by means of automatic machines.

This aim, these objects and others which will become apparent hereinafter are achieved by an adjustable hinge structure which is characterized in that it comprises an upper male element with a pin arranged downward and a lower female element having a first threaded stem which is adjacent to both the end adjacent to said male element and to a second threaded stem which protrudes from the latter, said first and second threaded stems being respectively associable with a fixed component and with a movable component.

Advantageously, said male and female elements have a body which is respectively provided with means for locking to said second threaded stem associable with a shutter and with means for adjusting the resting point of said pin.

Further characteristics and advantages will become apparent from the detailed description of a particular embodiment, illustrated only by way of non-limitative example in the accompanying drawing, wherein:

figure 1 is a view of the hinge taken along a longitudinal sectional plane, wherein for the sake of clarity the male and female elements have been arranged with their threaded stems at the same plane.

With reference to the above-described figure, the reference numeral 1 indicates an adjustable hinge structure which is composed of a male element 2 and a female element 3.

The male element 2 is constituted by a first essentially cylindrical body 4 which has a pin 5 advantageously protruding axially therefrom at one end toward the ground, therefore on the opposite side with respect to the usual arrangement of known hinges.

The female element 3 is also constituted by a

second essentially cylindrical body 6 which has a first through axial seat for said pin 5; said first seat is closed at one end by means of a friction means for adjusting the resting point of said pin.

The female element is advantageously arranged below the male element so that the first through axial seat 7 has an upward-directed opening 8 for the entry of said pin.

A first threaded stem 9 which protrudes radially from the second body 6 is furthermore rigidly associated with the female element proximate to the opening 8; said first threaded stem is associable at a fixed component such as a door frame.

The friction means for adjusting the resting point of said pin is constituted by a first screw means advantageously constituted by a first Allen screw 10 which is rotatably associable at a complementarily threaded portion defined on said first through axial seat 7, and has a pin 11, preferably made of plastic material such as nylon, which protrudes radially and interacts with the inner wall of said first seat 7.

The head of the first Allen screw 10 naturally protrudes below the second body 6.

The first body 4 which constitutes the male element 3 is instead provided with a second transverse through seat 12 for a second complementarily threaded stem 13 which is associable at a movable component such as a shutter or door 14.

Said second threaded stem, which protrudes proximate to the end of the first body 4 from which the pin 5 protrudes, has second screw means expediently constituted by an end shaped like the head of a second Allen screw 15. An annular groove 16 is defined proximate to said head and acts as engagement seat for a means for locking said second threaded stem with respect to said first body 4.

Said locking means is constituted by a third screw means advantageously constituted by a third Allen screw 17 which is rotatably associable at a complementarily threaded portion of a third axial seat 18 which partially affects the extension of the first body 4 starting from the end opposite to the one which bears the pin 5.

The end of said third Allen screw which is opposite to the head is shaped so as to arrange itself on said annular groove defined on said second threaded stem 13.

The use of the hinge structure is therefore as follows: during production, the second stem 13 is preliminarily associated with the first body 4 of the male element 2, locking it with the third Allen screw 17.

It is then possible to screw the second stem 13 to a shutter or door by means of a suitable machine.

The installer then associates the male element

2 with a movable component with the pin 5 directed downward.

The female element 3 is instead associated with a fixed component, such as a door frame or an upright of a piece of furniture, with the opening 8 of the axial seat 7 directed upward.

This arrangement allows to arrange the first and second stems close to one another.

It has thus been observed that the invention has achieved the above described aim and objects, a hinge structure having been obtained the components whereof are rapidly and easily associable with one another even by means of automatic machines.

Most of all, the hinge structure allows to achieve the optimum installation of the furniture element, such as a door, a window or a shutter, and is always axially aligned since it is not subjected to rotations.

The materials and dimensions of the individual components of the invention may naturally be the most pertinent according to the specific requirements.

Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the scope of each element identified by way of example by such reference signs.

## Claims

1. Adjustable hinge structure, characterized in that it comprises an upper male element (2), with a pin (5) directed downward and a lower female element (3) which has a first threaded stem (9) adjacent to both the end adjacent to said male element (2) and a second threaded stem (13) which protrudes from the male element (2), said first and second threaded stems (9,13) being respectively associable with a fixed component and with a movable component (14).

2. Structure according to claim 1, characterized in that said male and female elements (2,3) each have a body (4,6) which is respectively provided with means (15-18) for locking to said second threaded stem (13) which is associable with a movable component (14) and with friction means (10,11) for adjusting the resting point of said pin (5).

3. Structure according to claims 1 and 2, characterized in that said male element (2) is constituted by a first essentially cylindrical body (4) which has a pin (5) which protrudes axially at one end toward the ground.

4. Structure according to claims 1 and 3, characterized in that said female element (3) is constituted by a second essentially cylindrical body (6) which has a first through axial seat (7) for said pin (5), said first seat (7) being closed, at one end, by friction means (10,11) for adjusting the resting point of said pin (5), said female element (3) being arranged below said male element (2) so that said first seat (7) has an upward-directed opening for the entry of said pin (5).

5. Structure according to claims 1 and 4, characterized in that a first threaded stem (9) which protrudes radially from said second body (6) is rigidly associated with said female element (3) proximate to said opening, said first threaded stem (9) being associable with a fixed component.

6. Structure according to claims 1 and 2, characterized in that said friction means (10,11) for adjusting the resting point of said pin (5) is constituted by a first Allen screw (10) which is rotatably associable at a complementarily threaded portion defined on said first through axial seat (7), said screw having a pin (11) preferably made of plastic material, which protrudes radially and interacts with the inner wall of said first seat (7).

7. Structure according to claims 1 and 5, characterized in that said first body (4) of said male element (2) has a second transverse through seat (12) with which said second threaded stem (13) is associable, said second stem (13) having an end which protrudes outward from said body (4) and being associable with a movable component (14).

8. Structure according to claims 1 and 7, characterized in that said second threaded stem (13) has an end shaped like the head of a second Allen screw (15), an annular groove (16) being provided proximate to said head and acting as a seat for the temporary engagement of a means (17) for locking said second threaded stem (13) with respect to said first body (4), said locking means (17) being constituted by a third Allen screw (17) which is rotatably associable at a third axial seat (18) which partially affects the extension of said first body (4).

9. Adjustable hinge structure comprising a male element (2) defining a first body (4) having an axially protruding pin (5), and a female element (3) defining a second body (6) having formed therein an axial seat (7) rotatably accommodating said pin (5), first fixing means (9) being rigidly associated with said second body (6) and securable to a first member, second fixing means (13) being rigidly associated with said first body (4) and securable to a second member (14) to be hinged to the first member, characterized in that it further comprises a transverse through seat (12) formed in said first body (4) and accommodating said second fixing means, externally activatable locking means (16,17) accommodated in said first body (4) for releasably

locking said second fixing means (13) in said transverse through seat (12), and externally activatable adjustment means (10,11) accommodated in said seat (7) and acting axially on said pin (5).

10. Structure according to claim 9, characterized in that said externally activatable locking means (16,17) comprise screw means (17) positioned coaxial to said pin (5) and said adjustment means (10,11), and at least one engagement seat defined by said second fixing means and accommodating at least a portion of said screw means (17).

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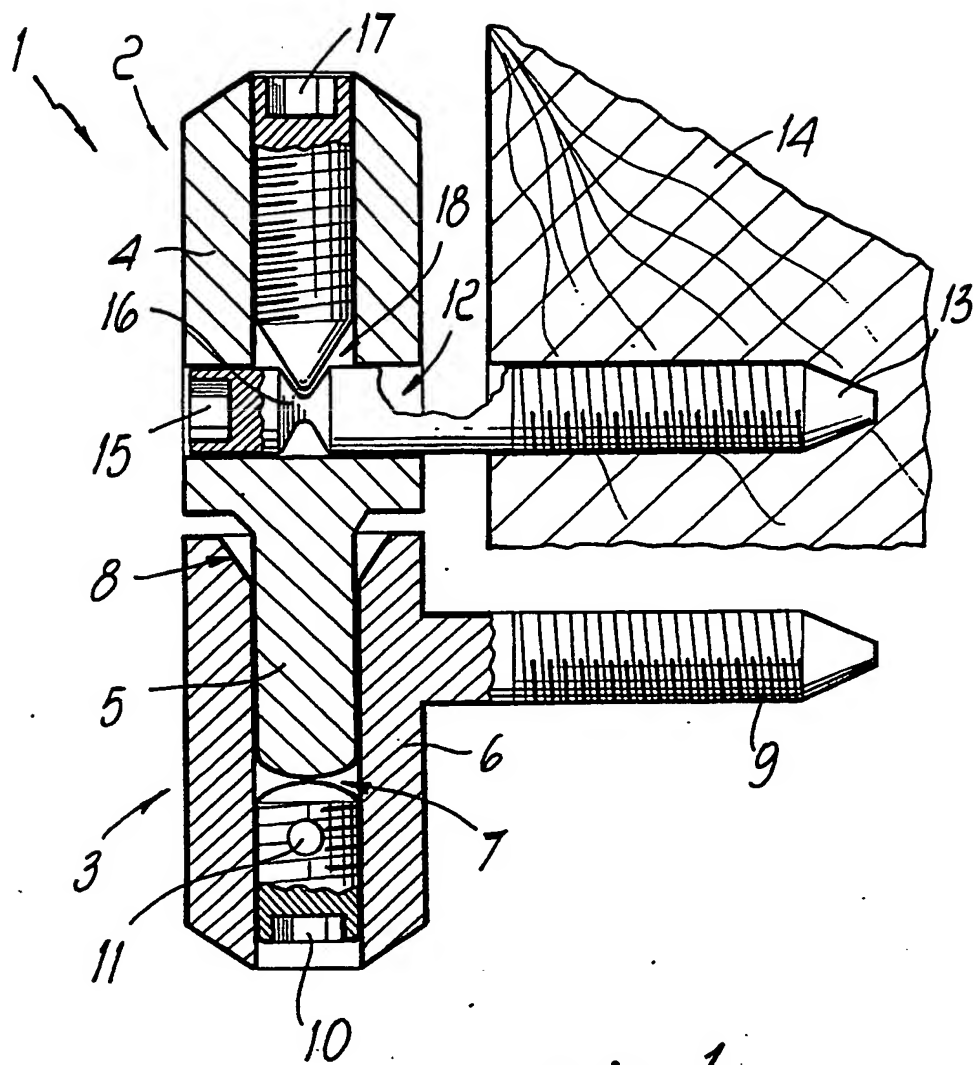
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## EUROPEAN SEARCH REPORT

Application Number

EP 90 11 1064

| DOCUMENTS CONSIDERED TO BE RELEVANT  |   |                   |  |
|--|---|-------------------|--|
| Category   | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (Int. CLS) |
| Y  | GB-A-2084240 (PFAFFLI)<br>* page 1, lines 50 - 80; figures 1, 2, 9 *          | 1, 2, 3           | E0507/04                                     |
| X  | * page 2, lines 78 - 79 *   | 9, 10             |  |
| A  | * page 2, lines 109 - 117 *   | 4, 6, 7, 8        |  |
| Y  | CH-A-654063 (FRITSCHER)<br>* page 2, lines 6 - 42; figures 1, 2 *             | 1, 2, 3           |  |
| A  |   | 5                 |  |
| A  | FR-A-2612979 (SAFERM COUGNAUD)<br>* page 3, lines 22 - 26; figure 2 *         | 4                 |  |
| A  | GB-A-2071201 (PFAFFLI)<br>* page 1, lines 112 - 121; figures 1, 9 *           | 6                 |  |
| The present search report has been drawn up for all claims   |   |                   |  |
| Place of search<br>THE HAGUE   |   |                   |  |
| Date of completion of the search<br>08 AUGUST 1990   |   |                   |  |
| Examiner<br>GUILLAUME G.E.P.   |   |                   |  |
| <b>CATEGORY OF CITED DOCUMENTS</b>   |   |                   |  |
| X : particularly relevant if taken alone<br>Y : particularly relevant if combined with another document of the same category<br>A : technological background<br>O : non-written disclosure<br>P : intermediate document  |   |                   |  |
| T : theory or principle underlying the invention<br>E : earlier patent document, but published on, or after the filing date<br>D : document cited in the application<br>L : document cited for other reasons<br>& : member of the same patent family, corresponding document |   |                   |  |

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